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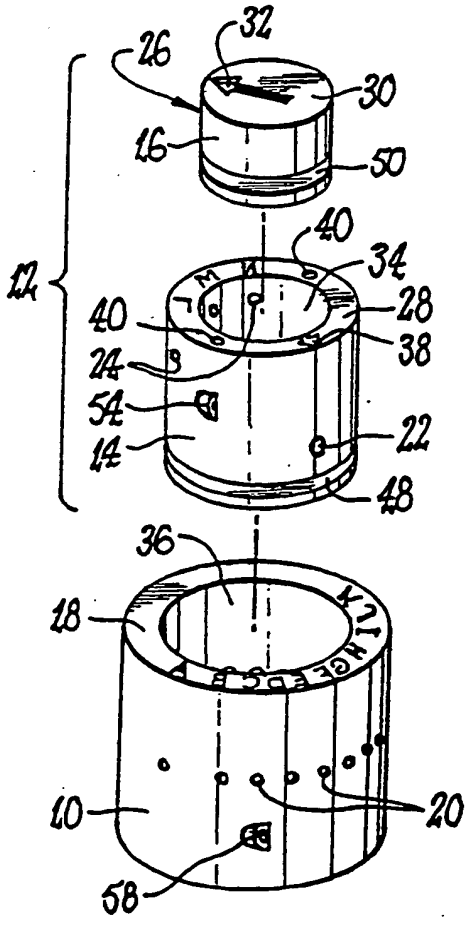
(54) Title: INDICATOR DEVICE

(57) Abstract

An indicator device which is able to be incorporated into a mould for the purpose of indicating on a moulded article relevant production data such as the date, or time, of production of an article produced by moulding. The indicator device comprises a housing defining a bore extending inwardly from an end face of the housing, and a cylindrical adjustment unit slidably received in the bore and retained in the bore so as to b rotatable therein. An end-face of the adjustment unit substantially flush with the end-face of the housing defines a continuation thereof in the form of a work-face.



INDICATOR DEVICE

This invention relates to an indicator device for use as part of a mould, and suitable for providing on a moulded article required, variable production data.

Previously, articles produced by moulding, such as by injection moulding of plastics, rubbers, or similar materials, or casting, such as die-casting, may have been marked with the date of their production by a stamping process additional to the moulding process. This involves additional expense, time, and maintenance, and necessarily increases the cost of production.

The present invention provides a device which is able to be incorporated into a mould for the purpose of indicating on a moulded article relevant production data such as the date, or time, of production of an article produced by moulding.

The indicator device of the present invention comprises a housing defining a bore, said bore extending inwardly from an end face of the housing, and a cylindrical adjustment unit slidably received in the bore and retained in the bore so as to be rotatable therein, with an end-face of the adjustment unit being substantially flush with the end-face of the housing and defining a continuation thereof in the form of a work-face.

The housing of the present invention may include retaining means suitable for allowing the rotation of the adjustment unit relative to the housing, whilst

constraining the adjustment unit against axial movement relative to the housing. In a preferred form the retaining means comprises a pin located within a peripheral groove. For example, the adjustment unit may include a peripheral groove located between its ends. The peripheral groove may be such that it receives a pin located in an aperture through the housing, with the aperture opening into the bore of the housing at a location off-set from an axis thereof. The pin may be secured within the bore of the housing, such as by screw threaded engagement.

In another form, the retaining means may be a C-spring or the like located within peripheral grooves. For example, the adjustment unit may include a peripheral groove located between its ends which is aligned with a corresponding peripheral groove in the internal wall of the housing, when the adjustment unit is in place within the housing. In this form, a compressible C-spring may be located in the aligned grooves about the adjustment unit. The spring is compressed to allow the adjustment unit to be received in the bore of the housing, and will expand to its natural configuration to locate in the peripheral groove of the housing. This arrangement results in a permanent locking arrangement between housing and adjustment unit, and is well suited for use with small embodiments of the indicator device where a pin located in an aperture may be impractical because of size constraints.

It should also be understood that the housing may be of any external shape, although it preferably is symmetrically shaped. Thus, the housing may have a circular cross-section.

The adjustment unit of the present invention may be comprised of one or more elements. In a preferred form there are two elements, an outer element and an inner element. In such case, the outer element may define a bore which extends inwardly from the end-face and, in which the inner element is slidably receivable, the inner element having an end-face flush with the end-face of the outer element, and defining a continuation thereof. The inner element may include retaining means in order to allow rotation of the inner element relative to the outer element whilst constraining the elements against relative axial movement. In a preferred form, the retaining means may be of the pin and peripheral groove arrangement described above. In another form, the retaining means may utilise a C-spring or the like also as described above.

The work-face of the device may include the production data required to be imparted onto an article during moulding. Said work-face may comprise the end-faces of the housing and adjustment unit, or the end face of the adjustment unit alone. In a preferred form of the device the adjustment unit comprises at least two elements, and the work face of the unit comprises the end-faces of the elements.

In a preferred form the production data provided on the work-face consists of or includes the date and time of production of an article. Such data may take the form of characters located circumferentially around the end-face of each element of the device, or may be arrows or some such indicator. For example, the end-face of the housing may include the numbers 1 to 31 indicating the day of the month of production. The end-face of the adjustment unit may then include an arrow, the adjustment unit being rotatable such that the arrow may be moved adjacent to a number on the end-face of the housing to indicate the relevant day. The work-face of the device would then be adjustable to provide the date of production of an article produced by the mould in which the device is incorporated.

In an alternative preferred form, the adjustment unit may comprise an inner and an outer element as already described. Production data may be provided on the end-face of the inner element and the end-face of the outer element. In this case, an arrow or the like may be provided on the outer element to indicate the relevant number on the end-face of the housing, together with a further group of numbers indicating further production data. The further group of numbers may be 1 to 12 indicating the month of production. In order to indicate a particular month the end-face of the inner element may include an arrow or the like. The inner element may then

be rotated to indicate a particular month on the end-face of the outer element. The adjustment unit may then be rotated to indicate a particular date on the end-face of the housing. The work-face of the device then serves to indicate the date and month of production of an article produced by the mould in which the device is incorporated.

The production data provided on the work-face need not be represented by numerals alone, and need not only relate to the date and time of production. The device may also be used to indicate data such as manufacturing conditions, or material compositions. The use of numbers to indicate times or dates is merely illustrative and should not be considered restrictive.

The production data on the work-face may be provided by indented or raised characters thereon. Such characters will be imparted onto a moulded article in the reverse form of which they appear on the work-face. Accordingly, any letters or numbers indented or raised on the work-face would need to be the mirror-image of those letters or numbers required. In a preferred form there may be a series of indented numbers in the end-face of the housing, a further series of numbers indented on the end-face of the outer element of the adjustment unit together with an indented indicating character, and a further indented indicating character on the end-face of the inner element of the adjustment unit. The indented numbers and indicating characters then form raised,

corresponding mirror-images of the production data required on an article moulded in a mould incorporating the device.

The device of the present invention may also include locking means for locking the adjustment unit in a required angular position relative to the housing. In a preferred form, the adjustment unit may be rotated to a position in order to indicate required production data, and may be releaseably locked in that position. Locking means may also be provided between the elements that may comprise the adjustment unit. For example, where there is an outer element and an inner element, locking means may be provided therebetween in order to releaseably lock the position of the inner element relative to the outer element.

In a preferred form, the locking means may take the form of a ball detent and complementary register holes. For example, the housing may include one register hole corresponding to each point of reference on the end-face thereon, such that there may be a series of register holes which extend around the housing parallel to the end-surface, and able to engage a ball detent provided in an external surface of the adjustment unit. Accordingly, when the adjustment unit is rotated, the ball detent moves from one register hole to another, temporarily being locked in one register hole until enough rotational force is applied to release the ball detent. It should also be noted that the ball detent described above may be

included in the interior surface of the housing, (such as in the bottom or peripheral wall of the housing) corresponding to register holes which may be provided in the external surface of the adjustment unit, (such as in the bottom or peripheral wall of the adjustment unit). It should also be noted that the register holes need not be "holes" as such, but may be grooves or any other means suitable to engage a ball detent.

The rotation of the adjustment unit, or any elements comprising the adjustment unit, may be achieved by any suitable means. In one preferred arrangement, at least one indentation is provided in the end face of the adjustment unit into which a key can be fitted to rotate that unit. Thus, there may be two holes, on opposite sides of the end-face of the adjustment unit, for use with a key having a body with a respective projection at each end locatable in each hole. In another arrangement an indented arrow or the like can be provided on the end-face of the adjustment unit, with a key in the shape of a screwdriver being able to be located in the indentation for rotation of that unit.

The device may be incorporated in a mould such that the work-face of the device is flush with an interior surface of the mould. Accordingly, a person skilled in the art would understand that the work-face may be substantially planar, or may be concave or convex such that the work-face remains symmetrical about the axis of

rotation.

In order to assist in arriving at an understanding of the present invention, a preferred embodiment is illustrated in the attached drawings. However, it should be understood that the following description is illustrative only and should not be taken in any way as a restriction on the generality of the invention as described above.

In the drawings:

Figure 1 is an exploded perspective view of a device according to a first embodiment of the present invention;

Figure 2 and Figure 3 are top views of possible production data able to be provided by the present invention;

Figure 4 is a perspective view of a key suitable for use with the device of Figure 1.

Figure 5 is a cross-sectional view of the device of Figure 1 when assembled; and

Figure 6 is a cross-sectional view of a second embodiment of the present invention, when assembled.

Illustrated in Figure 1 is a device having a cup-shaped cylindrical housing 10 and a cylindrical adjustment unit 12, with the unit 12 having a cup-shaped cylindrical outer element 14 and a cylindrical inner element 16. The housing 10 has an end-face 18 on which production data may be provided in the form of indented characters (see Figures 2 & 3). Register holes 20 are here shown drilled through the wall of housing 10 to

provide engagement with the ball detent 22 of outer element 14. Similarly, outer element 14 has register holes 24 which provide engagement with the ball detent 26 (see Figure 5) of inner element 16.

Register holes 24 are circumferentially spaced around outer element 14 such that each positionally corresponds to a character on the end-face 28 of outer element 14, and each register hole 20 of housing 10 positionally corresponds to a character on the end-face 18 of housing 10. Arrow 38 on the end-face 28 of outer element 14 can be brought into register with a respective character on end face 18 by bringing ball detent 22 into engagement with a respective hole 20. Similarly, arrow 32 on the end-face 30 of inner element 16 can be brought into register with a character on end-face 28 by bringing detent 26 into engagement with a respective hole 24. In order to maintain clarity herein the characters, which may be indented on the housing end-face 18 and the end-face 28 of outer element 14, are generally indicated by the letters A, B, C, D, etc. When inner element 16 is placed within the bore 34 of outer element 14, ball detent 26 is engaged with one of the register holes 24 each corresponding to a respective one of characters M, N, or O. Arrow 32 then indicates the relevant character. The same occurs when adjustment unit 12 is within the bore 36 of housing 10, with ball detent 22, engaging with one of register holes 20 and arrow 38 indicating the relevant charact r.

Preferred forms of possible production data are indicated by Figures 2 and 3. In Figure 2, the inner element 16 includes arrow 32, the outer element 14 includes numbers 1 to 3 which correspond to each of the three eight hour shifts in a day, as well as an arrow 38, and the housing 10 includes numbers 87 to 97 which correspond to the next ten years. In Figure 3, the arrows remain present, and the outer element 14 includes numbers 1 to 12 which represent months of the year, whilst housing 10 includes numbers 1 to 31 representing days of the month.

Also illustrated in Figures 2 and 3 are indented holes 40 which may be used by a key or the like in order to rotate the adjustment unit 12 relative to the housing 10. One form of such a key is illustrated in Figure 4. Key 42 has projections 44 which may be inserted into holes 40 enabling application of torque for rotating unit 12 relative to housing 10. Key 42 also has a tab 46 at one end which may be inserted into the indentation formed by arrow 32 enabling application of torque for rotation of element 16 relative to element 14. Holes 40, and arrow 32 are better illustrated as indentations in Figure 5.

Figure 5 illustrates housing 10 outer element 14 and inner element 16 when assembled, and locked in position. Referring also to Figure 1, outer element 14 and inner element 16 have peripheral grooves 48 and 50

respectively. Grooves 48, 50 are to locate pins respectively inserted through the walls of housing 10 and outer element 14, in order to allow rotation of outer element 14 and inner element 16, whilst restraining axial movement of either element. Figure 5 illustrates the peripheral groove 50 of inner element 16 with a pin 52 located within aperture 54 (see Figure 1) and received in groove 50. A similar arrangement is illustrated between outer element 14 and housing 10, with groove 48 receiving pin 56 inserted through aperture 58 (see Figure 1).

Also illustrated in Figure 5 are aligned cavities 60 and 62 which allow for an instrument to be inserted therein in order to remove each of the cylindrical bodies when dismantling is required. It should be understood that pins 52 and 56 would be removed before this was attempted.

Further illustrated in Figure 5 are the ball detents also illustrated in Figure 1. For example, between inner element 16 and outer element 14 ball detent 26 comprises ball bearing 64 and resilient means such as spring 66 within cavity 68. Ball bearing 64 is forced against the outer element 14 where it engages in a selected one of register holes 24 to releaseably lock the position of the inner element 16 in relation to the outer element 14. A similar arrangement is provided between housing 10 and adjustment unit 12, with ball bearing 70, and resilient means 72 in cavity 74.

Illustrated in Figure 6 is an arrangement embodying

an alternative for the retaining means and the locking means. Figure 6 illustrates a housing 74, an outer element 76 and inner element 78, when assembled, and locked in position. Housing 74 and outer element 76 have axially aligned peripheral grooves 80 and 82 respectively, and outer element 76 and inner element 78 have axially aligned peripheral grooves 84 and 86 respectively. Each set of aligned peripheral grooves locate a respective C-spring 88, 90 which serves to restrain axial movement of housing 74 relative to outer element 76 and outer element 76 relative to inner element 78.

Further illustrated in Figure 6 are ball detents which serve as locking means. In this embodiment, a ball detent comprising a ball bearing 92, and resilient means 94 within cavity 96, is positioned between housing 74 and outer element 76 in the bottom region thereof. Ball bearing 92 is forced against the bottom surface 98 of outer element 76, where it engages in one of register grooves 100, spaced circumferentially around the bottom surface 98, to lock the position of the housing 74 releaseably in relation to the outer element 76. A similar arrangement is provided between outer element 76 and inner element 78, with ball bearing 102, and resilient means 104 within cavity 106, engaging with grooves 108. It should also be understood that, as with the embodiment illustrated in Figures 1 to 5, in the embodiment illustrated in Figure 6, each register groove

preferably corresponds to a character on the end-face of each element.

Thus, the present invention provides an apparatus which may be inserted in the wall of a mould used for moulding techniques such as injection moulding, and may be adjusted to indicate production data, such as the date or time of production, of a moulded article. The apparatus may then be adjusted after each shift, or at the beginning of a new day, month, or year. Such an adjustment does not require a major shutdown, or a time-wasting change of apparatus.

Those skilled in the art will appreciate that there may be many variations and modifications of the configuration described herein which are within the scope of the present invention.

The claims defining the invention are as follows:

1. An indicator device comprising a housing defining a bore, said bore extending inwardly from an end-face of the housing, and a cylindrical adjustment unit slidably received in the bore and retained in the bore so as to be rotatable therein, with an end-face of the adjustment unit being substantially flush with the end-face of the housing and defining a continuation thereof in the form of a work-face.

2. An indicator device according to claim 1, including retaining means allowing rotation of the adjustment unit relative to the housing, whilst constraining the adjustment unit against axial movement relative to the housing.

3. An indicator device according to claim 2, wherein the retaining means comprises a peripheral groove located between the ends of the adjustment unit, and a pin located in an aperture in the housing and opening into the bore of the housing, an end of the pin being received in said groove.

4. An indicator device according to claim 2, wherein the retaining means comprises a first peripheral groove in an internal surface of the housing, and a second peripheral groove in an external surface of the adjustment unit, said first and second peripheral grooves being substantially axially aligned when the indicator device is assembled, and a C-spring located within the aligned peripheral grooves to retain the adjustment unit within the housing.

5. An indicator device according to any one of claims 1 to 4, including locking means for releaseably locking the adjustment unit in a required angular position relative to the housing.

6. An indicator device according to claim 5, wherein the locking means comprises a ball detent and complementary register holes or grooves, where each register hole or groove corresponds to a point of reference on the work-face of the indicator device.

7. An indicator device according to any one of claims 1 to 6, wherein the adjustment unit comprises an inner element and an outer element, and said outer element defines a bore which extends inwardly from the end-face of the outer element in which the inner element is slidably receivable, the inner element having an end-face substantially flush with the end-face of the outer element, and defining a continuation thereof.

8. An indicator device according to claim 7, including retaining means to allow rotation of the inner element relative to the outer element, whilst constraining axial movement relative to the outer element

9. An indicator device according to claim 8, wherein the retaining means comprises a peripheral groove located between the ends of the inner element, and a pin located in an aperture in the outer element and opening into the bore of the outer element, an end of the pin being received in said groove.

10. An indicator device according to claim 8 wherein the retaining means comprises a first peripheral goove in an

internal surface of the outer element, and a second peripheral groove in an external surface of the inner element said first and second peripheral grooves being substantially axially aligned when the indicator device is assembled, and a C-spring located within the aligned peripheral grooves to retain the inner element within the outer element.

11. An indicator device according to any one of claims 7 to 10, including locking means for releasably locking the inner element in a required angular position relative to the outer element.

12. An indicator device according to claim 11, wherein the locking means comprises a ball detent and complementary register holes or grooves, where each register hole or groove corresponds to a point of reference on the work-face of the indicator device.

13. An indicator device according to claim 1, substantially as herein described with reference to Figures 1 to 5 or Figure 6.

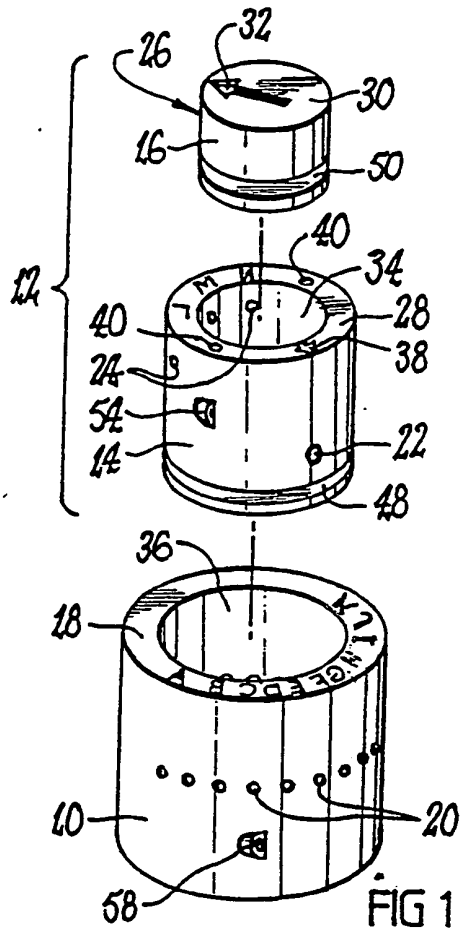


FIG 1

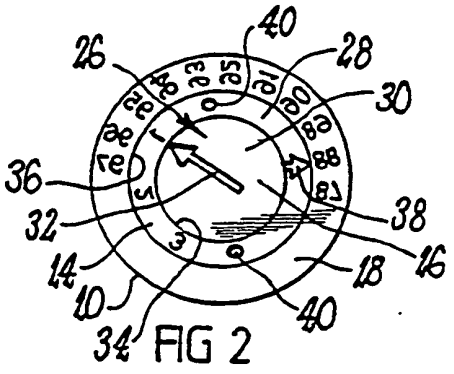


FIG 2

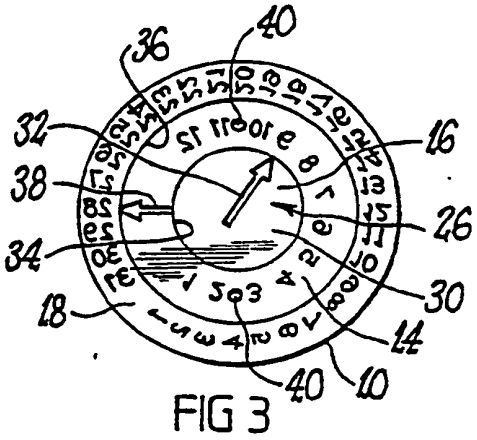


FIG 3

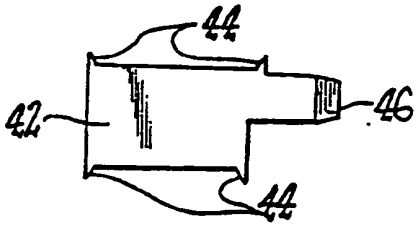


FIG 4

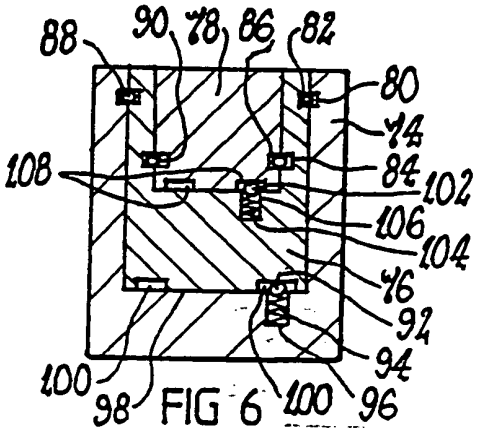


FIG 6

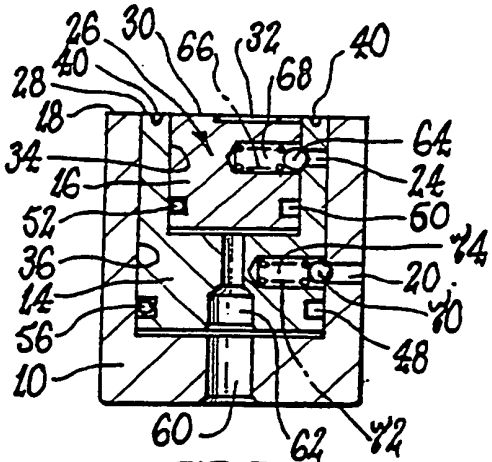


FIG 5

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 88/00380

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[4] B41K 1/04, 1/06, 1/10 // B29C 33/00, 33/12, 33/14

II. FIELDS SEARCHED

Minimum Documentation Searched †

Classification System	Classification Symbols
IPC	B41K 1/04, 1/06, 1/10; B29C 33/00, 33/12, 33/14
US Cl.	346/81, 346/88, 346/90, 346/92

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched ‡

AU : IPC as above + B41F 19/08

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
X	US,A, 3725952 (SULZBERGER) 3 April 1973 (03.04.73)	(1,2)
X	US,A, 3623125 (McGOWAN) 23 November 1971 (23.11.71)	(1,2)
X	US,A, 1683319 (ADLON) 4 September 1928 (04.09.28)	(1,2,7,8)
A	US,A, 1332960 (SHERAS) 9 March 1920 (09.03.20)	
X	FR,A, 1196107 (MUREX) 20 November 1959 (20.11.59)	(1,2,5)

* Special categories of cited documents: **

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
20 December 1988 (20.12.88)	6 JANUARY 1989 (06.01.89)

International Searching Authority	Signature of Authorized Officer
Australian Patent Office	R.B. CAMPBELL

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 88/00380

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Members					
US 3725952	BE	756315	CH	14166/69	DE	2044491
	FR	2062203	GB	1323899		

END OF ANNEX